

**ABSTRACT**

A terrestrial repeater is disclosed for use in a satellite transmission system that may also include a plurality of satellites. The terrestrial repeaters are implemented as OFDM transmitters to minimize the channel impairments caused by multi-path propagation. The OFDM terrestrial repeaters differentially encode the transmitted signal over frequency, as opposed to time, in order to avoid channel phase distortion. The OFDM receiver allocates two unmodulated sub-carriers as pilot bins and thereby provides two sub-carriers as a reference within each OFDM symbol. At the OFDM receiver, the two unmodulated pilot bins contain no phase information and provide a reference for the differential demodulation performed by the OFDM receiver. The OFDM transmitter operates in two modes, namely, a normal mode and a transmitter identifier information (TII) mode. The TII mode contains all of the functions of the normal mode, and also transmits a repeater identification signal with the customer data, using the inactive OFDM sub-carriers (bins). In a normal mode, the OFDM transmitter optionally fills unused (inactive) sub-carriers with zeroes and in a TII mode, the OFDM transmitter uses at least some of the unused (inactive) sub-carriers to transmit the transmitter identifier information (TII). The predefined TII value is mapped onto a set of complex symbols. The TII signal facilitates the receiver test equipment in associating the received signal with the terrestrial repeater(s) that generate the TII signal.

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